• Brief Report •

Cataract surgery on post radial keratotomy patients

Alessandro Meduri[1], Mario Urso[1], Giuseppe A. Signorino[1], Miguel Rechichi[2], Cosimo Mazzotta[3], Stephen Kaufman[4]

[1]Department of Surgical Specialties, Ophthalmology Clinic, University of Messina, Messina 98100, Italy
[2]Department of Ophthalmology, University Magna Graecia, Catanzaro 88100, Italy
[3]Mazzotta Cross-Linking & Refractive Surgery Center, Siena 53100, Italy
[4]Department of Ophthalmology, State University of New York-Downstate, Brooklyn and Manhattan, New York 11203, United States

Correspondence to: Mario Urso. Department of Surgical Specialities, Ophthalmology Clinic, University of Messina, Messina 98100, Italy. mariourso@tiscali.it
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Abstract

• This study aims to evaluate and to compare three different approaches of cataract surgery to patients with previous radial keratotomy (RK), and to analyze the mechanical properties of the cornea after cataract surgery. Three groups of patients, each one including 8 eyes of patients with 16 RK incisions. The first group includes eyes with the first cataract incision superiorly, the second group in the temporal area, the third group in temporal area and a precautionary stabilizing suture across the RK incision adjacent to the main tunnel. In the first group intraoperative dehiscence occurred in three eyes (37.5%): it required immediate application of a suture. In the second group dehiscence occurred intraoperatively in two radial scars (20%): it required immediate application of a suture. In the third group, no intraoperative dehiscences were observed. The stabilizing suture of the RK incision works safer, with a lower risk of dehiscences and less post-operative astigmatism.

• **KEYWORDS:** radial keratotomy; scar dehiscence; cataract

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INTRODUCTION

Radial keratotomy (RK) is a refractive surgical procedure to correct myopia and astigmatism, in certain patients. It involves making numerous radial incisions extending from the pupil to the periphery of the cornea in a radial pattern like the spokes of a wheel. It was very popular in the 90's. In the following years, RK was gradually phased out in favor of more versatile and reproducible surgeries overcome on the scene, such as photorefractive keratectomy (PRK) and laser-assisted *in situ* keratomileusis (LASIK). In our region, the number of post-RK patients needing cataract surgery is rising because they are aging and so they have more probabilities of developing cataract. Performing cataract surgery on a patient after RK presents a number of challenges for the cataract surgeon. Chief among these is the technical challenge of performing the primary incision, due to the risk of RK scar dehiscence[1-5].

METHODS

Before enrolling in our clinical trial an explanation of the purposes of the research and a description of all the procedures that will be completed on the clinical trial was given to each patient. Before performing cataract surgery each patient gave written informed consent. This prospective randomized study was performed in Policlinic University of Messina (Italy), Ophthalmology Section, according to the procedures of the Declaration of Helsinki. In our study eighteen patient with history of 16 cuts radial keratotomy were examined and divided into three groups, giving a total of 24 eyes. All phacoemulsifications were performed using the "stop and chop" technique with a Sovereign-Abbott Medical Optic or Infinity-Alcon device. Best corrected preoperative visual acuity (VA) ranged from 0.7 logMAR to 0.2 logMAR. The cataract density was moderate (grade 2 nuclear and cortical cataract according to LOCSIII classification). The median age of patients was 57.5y (45-70y), while average age since previous RK was 9.6y (from 1 to 16y post-RK time). All of the patients underwent a complete preoperative evaluation. Adequate IOL calculation was decided using postrefractive surgery IOL calculator provided on the ASCRS's website. Each patient underwent a postoperative examination at day 1, at week 1, at week 2 and then at month 1. Phacoemulsification was performed in the first group with a superior entrance main incision, using a 2.75 mm keratome blade. The second group underwent phacoemulsification with a temporal entrance main incision, instead the third group had a temporal main incision plus a 10-0 nylon stabilizing suture, placed before surgery

across the RK scar over the tunnel (Figure 1) and removed two weeks after surgery. To minimize the risk of surgery on the weakened, post-RK cornea infusion flow was setted to 28 mL/min, vacuum to 300 mm Hg, US power 20% and smaller phacoemulsification tips were used to ensure that the fluid inflow remained greater than the fluid outflow. Finally, we closed the cataract incision with a suture in cases where stromal hydratation may disturb RK scars. Data obtained were analyzed using ANOVA test and their significance was confirmed by student's *t*-test.

RESULTS AND DISCUSSION

After Surgery In the first group intraoperative dehiscence occurred in three eyes (37.5%), without aqueous leakage from the anterior chamber, and required immediate application of a suture to maintain corneal stability. The mean residual astigmatism was +1.25±0.46 diopters. The best corrected visual acuity (BCVA), exceeding 0.3 logMAR, was not achieved in two patients, and 0.2 logMAR in the third patient. In the second group dehiscence occurred in two radial scars (20%) and the mean residual astigmatism was +1.09±0.44 diopter. The BCVA was respectively 0.2 logMAR, and 0.1 logMAR. In the third group, no intraoperative dehiscences were observed, with an average astigmatism of +0.75±0.29 diopters. In the presence of dehiscence phacoemulsification was completed without further complications, with insertion of a foldable silicone intraocular lens. Any suture was removed fifteen days after phacoemulsification. A statistically significant difference merged in post-surgical VA between groups 1 and 3 (P=0.028) and between groups 2 and 3 (P=0.017), while differences between groups 1 and 2 were not statistically significant (P=0.133) as shown in Table 1.

The phacoemulsification exposes to an increased risk of dehiscence or rupture of previous RK incisions, because of an impaired corneal biomechanics[6-8]. The literature documents cases of dehiscence and rupture of one or more RK incisions during surgical interventions for retinal detachment, keratomileusi, corneal transplantation and cataract surgery[9]. Furthermore, several studies have been conducted to investigate the stability of the eyeball and they have shown that the rupture of a RK corneal scar takes about half strength of that in the cornea of an unoperated eye, with variability from individual to individual[10-11]. Moreover, even after many years, the cornea never regains its original integrity, with the persistence of the presence of epithelial cells in the scars[12]. To obtain optimal results with cataract surgery in these patients, appropriate preoperative studies and specific intraoperative precautions must be adhered to[13-15]. First, we focused on a careful placement of the incision for phacoemulsification, evaluating the space between the incisions, avoiding to intersect any RK incision. Surgeons should implement some strategies to optimize management of cataract patients with previous RK:

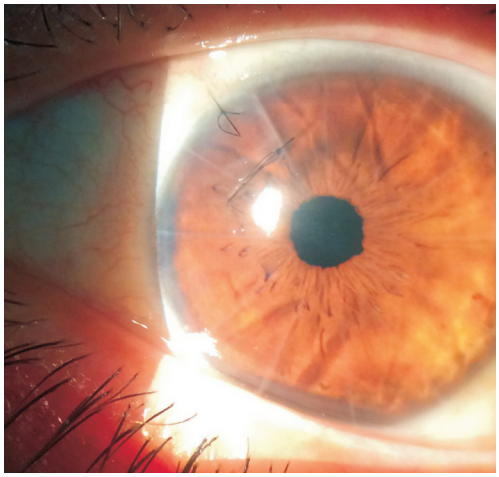

Figure 1 Stabilizing nylon suture on corneal tunnel in a post-radial keratotomy (group 3).

Table 1 Pre-operative and post-surgical charateristics of patients included in the study

Examined parameters	Group 1	Group 2	Group 3
Mean preop. VA (logMAR)	0.3±0.19	0.3±0.15	0.3±0.17
Mean postop. VA (logMAR)	0.2±0.14	0.1±0.06	0.1±0.07
Mean postop. astigmatism (diopters)	+1.25±0.46	+1.09±0.44	+0.75±0.29
Dehiscence	37.5%	20%	0

VA: Visual acuity.

use a clear corneal incision only if there is sufficient distance between the RK cuts. If an RK scar is transacted by the primary incision, significant instability of the wound will likely result, with consequent incompetence and aqueous leakage. In our experience when an RK incision began to open or leak, we stopped, closed it with a 10-0 nylon suture, and left the knot on the surface, which we removed two weeks postoperatively. But, in group 3, the suture was placed at the opening of surgery perpendicularly to the adjacent RK incision, to prevent any dehiscence. The main tunnel can be done with either a temporal or a superior incision, whichever is more convenient. The temporal site is best suited for deep sockets where the maneuverability through the superior site would be difficult. Above all, we measured a faster visual recovery in patient of group 3, so we consider the use of a precautionary stabilizing suture to be a useful technique to obtain a fast recovery and more predictable result in cataract surgery on radial keratotomy patients. Although our sample size is small and not broadly representative, this study has shown that for patients with history of radial keratotomy surgery, it is preferable to perform cataract surgery using temporal access, with the placement of a corneal suture to stabilize the RK scars, located adjacent to the incision for the phacoemulsification. This procedure significantly reduced the risk of dehiscence of RK scars during phacoemulsification (P<0.05), preserving the intact corneal anatomy and offering a better visual prognosis. Therefore, considering that in groups 1 and 2, where the patients' eyes

were treated without preventive suture, we registered some cases of dehiscences, we want to emphasize of the stabilizing suture of the RK incision, considering that there were no RK incision dehiscences in group 3. We want to emphasize the value of this study, considering that fewer dehiscences lead to fewer severe complications, such as endophthalmitis and corneal edema. So with our stabilizing suture makes it possible to work safer, with a lower risk of dehiscences and less post-operative astigmatism.

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